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A new hypothesis for early Bronze Age cultural diversity in Xinjiang, China

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ABSTRACT

This paper outlines current knowledge about the early Bronze Age in Xinjiang, discussing evidence for external influences and indigenous cultural development. It identifies three cultural clusters, Qiemu'erqieke, Tianshanbeilu (Linya) and Xiaohe, showing how the general origins of the first two can be broadly defined. For the third, Xiaohe, for which archaeological evidence of its origins is highly ambiguous, the paper offers a theoretical hypothesis based on Island Biogeography Theory.

1. Introduction

The earlier stages of the Bronze Age of Xinjiang are represented by two unique cultures that occupy their own distinctly individual environmental niches; they are also strikingly different from cultures in the surrounding areas which may have influenced their original development. In the northern mountain grasslands is the Qiemu'erqieke culture with graves marked by massive anthropomorphic monoliths; in the south the uniquely organically preserved cemetery of Xiaohe in the depths of a harsh sandy desert represents a culture centred on water transport and cattle herding, with a highly complex symbolic ideology. There is also a third culture to the east, the Tianshanbeilu (Linya) culture, characterised by the Tianshanbeilu Cemetery, which has its own corpus of elaborate and colourful painted ceramics. However, its dating is problematic and only some suggestions of relative parallels with Chinese painted ceramics have hinted that it might go back as early as the 3rd millennium BCE (Han, 2005; Jia et al., 2009: 81). A key question is how and why Xinjiang produced such broad cultural variations. A new hypothesis presented here shows how this apparently remarkable diversity might be explained, specifically in relation to the most extraordinary of all the cultures, that of Xiaohe in the Tarim Basin of southern Xinjiang.

To address this question, it is essential firstly to consider the landscape and environment of Xinjiang itself (Fig. 1). To the west it is bordered by high hill country; across the centre runs the steep mountain range of the Tianshan, separating the two central deserts. The smaller northern Gurbantungut stony desert is arid and unpopulated. The larger southern sand desert of the Taklamakan is highly inhospitable, but rivers running down from the Tianshan and the Tibetan plateau support small oases around the perimeter, and some rivers such as the

Tarim run deep into the desert, creating long corridors of water and vegetation. The routes of the rivers fluctuate, and people dependent on them must be mobile enough to follow their swings to ensure their survival in this otherwise hostile environment. The eastern end of Xinjiang borders the stony wastes of the Gobi Desert. The southward swing of the Altai and the northward turn of the Tibetan plateau narrow the route in and out of Xinjiang to the Hexi Corridor running into Gansu and eventually down to the middle Yellow River Valley. Despite its hazards and difficult terrain, this was the only viable land passage linking ancient China to the west. Cultural pathways into Xinjiang from the west almost all involve passage over high mountain passes. While the precise routes are varied, the cultural influences can be classified into three main groups. For the Bronze Age generally, to the north-west there were the Eurasian pastoralists of the steppes and the Altai mountains; to the south-west the settled oasis cultures of Central Asia, and to the south a mixed cluster of little known agro-pastoralists around the Pamirs, Hindu Kush and the western Himalayas.

1.1. Xinjiang cultures

Very little is known about Xinjiang before the Bronze Age., There was a sparse pre-agricultural hunter-gatherer population (Jia et al., 2011: 171; Debaine-Francfort, 1988: 7 ff.), but their presence has largely been recorded only through surface scatters of stone tools (Fig. 2). Recent excavations at the cave site of Tongtiandong in the southern Altai have revealed evidence for human activity at around 40 k BP (Yu & He, 2017), and one other stratified but undated pre-Bronze Age context is known, from the site of Jilintai in the Yili Valley (Ruan, 2013).

Until recently, the Xinjiang Bronze Age was believed to begin

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Fig. 1. Map of western China and Central Asia.



Fig. 2. Goukou: a pre-Bronze Age site in the north-eastern Tianshan (A. Betts).

arbitrarily around 2000 BCE, but as our understanding of the region improves, we can now trace back recognisable cultural complexes into the 3rd millennium BCE, albeit still rather poorly dated. One of the two earliest known Bronze Age cultural traditions in Xinjiang is that of Qiemu'erqieke in the north, centred in the Altai foothills, with links to southern Siberia and Mongolia (Fig. 3) (Jia & Betts, 2010; Kovalev, 2008; Kovalev, 2015; Kovalev et al., 2008; Xinjiang Institute of Archaeology, Academy of Social Science, 1981). It has a ceramic inventory characterised by grey wares with sophisticated patterns of incised decoration (Fig. 4). Little is known of its economic basis as no settlement sites have yet been identified. It is known only from its cemeteries with their distinctive anthropomorphic stelae (Fig. 5) (Jia & Betts, 2010; Lu et al., 2001; Xinjiang Institute of Archaeology, Academy

of Social Science, 1981; Xinjiang Institute of Archaeology, Academy of Social Science, 1985). It has recently been argued (Jia & Betts, 2010) that the Qiemu'erqieke tradition shares its closest affinities with the Okunevo southern Siberian cultural tradition, now dated between the later 3rd millennium and the early 2nd millennium BCE (Svyatko et al., 2009). Two chronological stages have also been identified in the Qiemu'erqieke tradition in Xinjiang (Jia & Betts, 2010), with the second stage represented in the Altai, but also in an expansion south-west along the Tarbagatay range to the western Tianshan where traces of them have been found in the Bo'ertala Valley (Jia et al., 2017), and south-east along the Altai and across the Gurbantunggut desert to the eastern Tianshan at Jimusar and neighbouring regions. Some recently discovered cemeteries in western Mongolia, eastern Kazakhstan and the

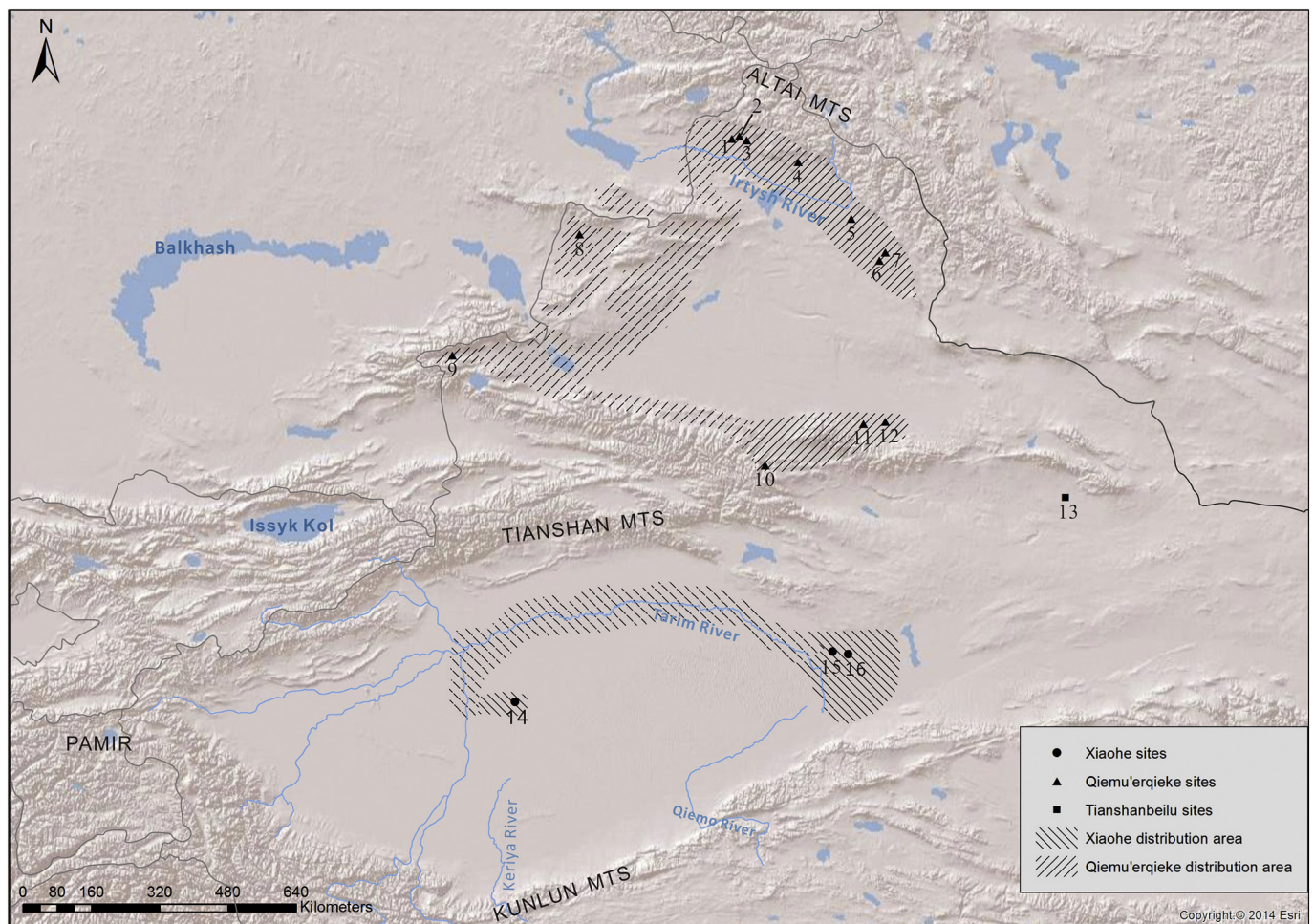


Fig. 3. Distribution of early Bronze Age sites in Xinjiang.

1. Ganbaituo Cemetery II. 2. Kuobo'er (Ahejia'er). 3. Bolati Cemetery III. 4. Qiemu'erqieke. 5. Burial at Fuyun. 6. Chagan'guoleng. 7. Basikekeren. 8. Sasibulake. 9. Stone stelae at Wenquan. 10. Sa'ensayi. 11. Burial at Jimusa'er. 12. Kan'erzi. 13. Tianshanbeilu. 14. Beifang Cemetery. 15. Xiaohu. 16. Gumugou.

Russian Altai have been identified by Kovalev and Erdenebaatar (Kovalev, 2008: 348; Kovalev et al., 2008) as relating to the Qiemu'erqieke tradition. Kovalev places the date range for his “Chemurchek” sites at 2500–1800 BCE (Kovalev, 2008: 344) (cf. Jia & Betts, 2010). New excavations at a Qiemu'erqieke site in the Chinese Altai have provided dates around 2400 BCE (Xinjiang Institute of Archaeology, 2014), while another recently excavated cemetery, Sa'ensayi, near Urumchi, in the central region of the northern Tianshan, contained a grave of Qiemu'erqieke type, with similar ceramics and stone bowls, dated to 2470 cal. BCE (Archaeological Institute, 2013). Broadly, the best current dating estimate for the earliest stage of the Qiemu'erqieke culture is around the mid-3rd millennium BCE, with the tradition lasting probably up until c. 1700 BCE.

The Qiemu'erqieke cultural signature includes distinctive incised ovoid round-bottomed jars, stone vessels of the same design but with few or no incisions, and well-made flaked stone arrowheads (Fig. 4). Burials are in large stone cists within a stone enclosure. Geometric designs are occasionally found painted on the interior of the stone slabs of the cists. The entrances to the enclosures are marked by large, often highly detailed, anthropomorphic stelae representing both men and women (Fig. 5). The Qiemu'erqieke people carved clusters of stylised human faces onto rocks near the areas where they buried their dead, and probably also where they lived. Qiemu'erqieke cultural traits are strongly developed and highly distinctive, but their roots can be seen in the early Bronze Age cultures of the Altai and southern Siberia, the Afanasievo and the Okunevo. These include cist burials, ceramics with

incised patterns, some of which were round-bottomed, stone arrowheads and anthropomorphic stelae. While there is almost no evidence for Qiemu'erqieke economic practices, it is most likely that they were predominantly mobile pastoralists, as were the Afanasievo and Okunevo peoples (Frachetti, 2008: 39–40). Cemeteries are in the mountain grassland areas used by later pastoralist groups up to recent times (Fig. 6). Since the greatest concentration of sites occurs along the Altai, with the spread into northern Xinjiang and into the Tianshan a more limited expansion, it seems likely that the Qiemu'erqieke culture arrived in Xinjiang through a gradual search for new pastures and other resources, but it is certainly possible that it assimilated indigenous pre-Bronze Age populations as it expanded.

The Tianshanbeilu (Linya) culture is known only from the Tianshanbeilu Cemetery in Hami City. Hami lies towards the eastern end of the Tianshan, at the north-west end of the corridor connecting central China and Eurasia. Here these influences are clear in the appearance of painted pottery undoubtedly derived from eastern designs (Fig. 7). More than 700 burials were excavated in the Tianshanbeilu Cemetery from 1988 to 1997 (Lu et al., 2001). Hand-made, painted redware vessels were placed in the graves. The designs were mainly executed in black with some use of a purplish-red paint. Globular jars with double handles are among the most common forms. There are also taller cylindrical jars, again with double handles and painted decoration. The cylindrical jars suggest links between the eastern Siba culture found in Gansu and the western steppic ceramic traditions (Shui, 1993). The Tianshanbeilu culture is still poorly dated, with some disputed C14

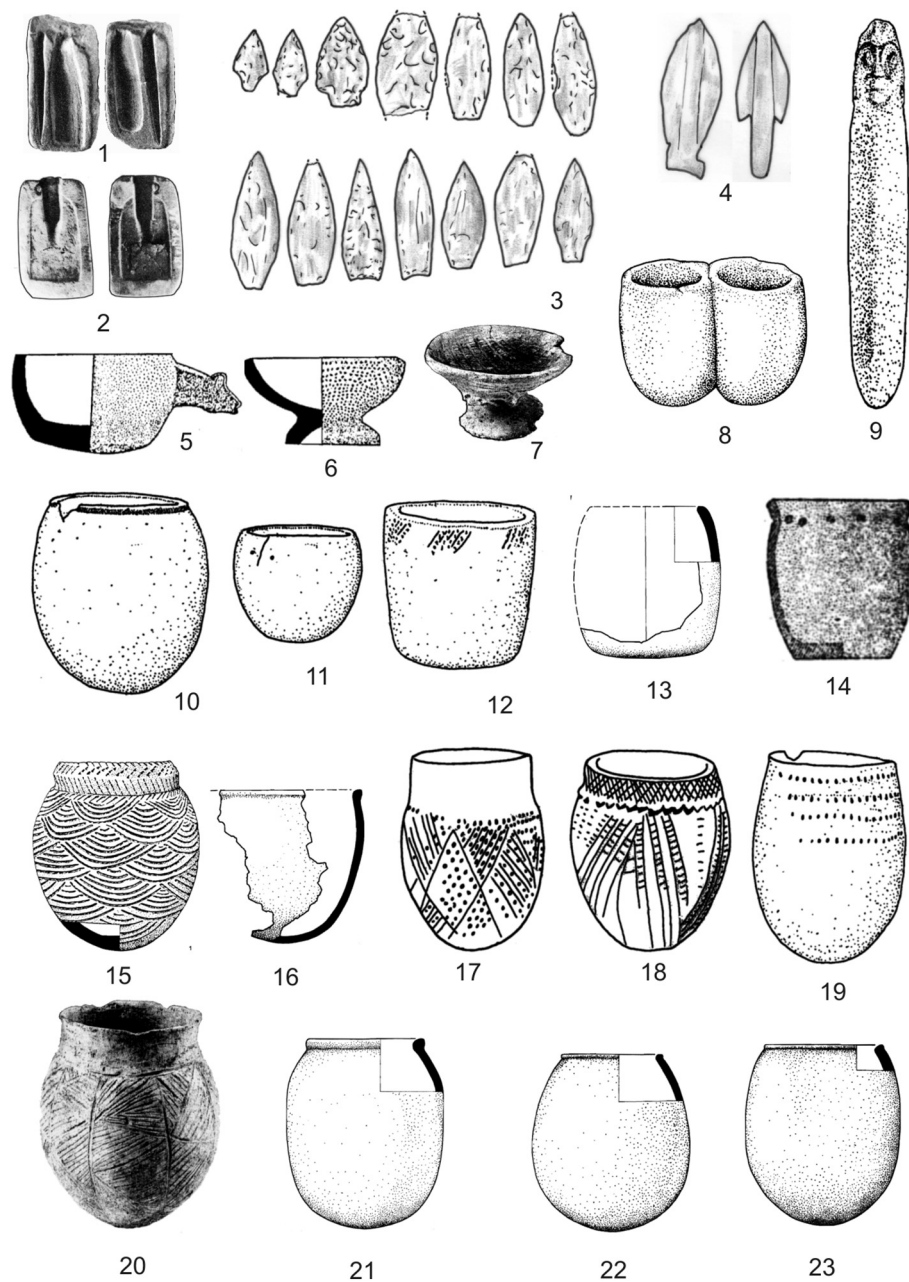


Fig. 4. Artefacts of Qiemu'erqieke tradition: 1–3, 8, 9, 11, 12, 15, 18 (Xinjiang Institute of Archaeology, Academy of Social Science, 1985); Plates 66, 68–70, 72–75; 4, 14, 16, 17 (Xinjiang Bureau of Relics et al., 1999: 298, 336, 340); 5, 6 (Xinjiang Institute of Archaeology, Academy of Social Science, 1981); 7, 22 (Zhang, 2007); 10, 13, 19–23 (Kovalev, 1999). 1. Knife mould; 2. Spade mould; 3. Various stone arrowheads; 4. Bronze arrowheads; 5. Stone vessel; 6–7. Ceramic lamps; 8. Stone double vessel; 9. Stone figurine; 10–11. Stone jar; 12–20. Ceramic jars; 21–23. Stone jars.

dates and several opinions on relative chronology. Han has noted apparent parallels between pottery from Tianshanbeilu and that of the Éneolithic Machang culture found in Gansu dating to around 3800–2000 BCE (Han, 2005: 81), as well as double-handled jars from the Hami region with a painted lattice pattern and other designs reminiscent of the painted pottery associated with the Machang phase (Han, 2012). Li (Li, 2009) has identified one among several classes of ceramics which is believed to be the result of acculturation between the Gansu prehistoric tradition in Eastern Asia and the Eurasian style of vessels with pointed bases. However, so far there is no evidence for direct connections between the Eurasian cultures in the west and the Tianshanbeilu culture in the east.

The second well-dated early tradition in Xinjiang, in the south, is that of Xiaohe, a largely aceramic culture based in the rivers and oases

of the Tarim Basin (Fig. 8) (Abuduresule et al., 2007). It is completely different from any contemporary cultures in Xinjiang or elsewhere and is known primarily from the highly elaborate nature and quite remarkable organic preservation of its burials (Fig. 9, 10). The Xiaohe culture is known from two key sites, the Xiaohe Cemetery itself (Xiaohe Archaeological Team, 2004; Xiaohe Archaeological Team, 2005; Xiaohe Archaeological Team, 2007) and the cemetery of Gumuguo (Han, 1986; Wang, 2014) in the same region. More recently a similar cemetery, the Northern Cemetery, was found some 600 km to the south-west on the lower reaches of the Keliya River, showing that the culture was once widespread along the rivers that cut through the Taklamakan desert. The Xiaohe people cultivated wheat and barley (Yang et al., 2014), although probably on a small scale, and herded cattle (Abuduresule et al., 2007; Cai et al., 2014; Mai et al., 2016). The earliest phase for the



Fig. 5. Stone stelae, Kayinar Cemetery, Qiemu'erqieke (A. Betts).



Fig. 6. Mountain grasslands in the northern Tianshan (A. Betts).

Xiaohe culture has been dated to 2200–1880 BCE when it began to develop in the centre and eastern region of the Tarim Basin (Abuduresule et al., 2018). The type site lies in the now barren, saline depression of Lop Nur, once a massive lake fed by the Tarim River. By the early to mid-2nd millennium BCE, regional variations in the material remains indicate that the Xiaohe culture began to split into two groups. The two groups of the Xiaohe culture are represented by the variants of Keriya–Xiaohe and Gumugou–Xianshuiquan respectively (Abuduresule et al., 2007; Abuduresule et al., 2018).

The Xiaohe people exploited a lacustrine and riverine environment bordering on an extreme desert (Li et al., 2013; Zhang et al., 2017). Their cattle were clearly central to their lives. Their coffins were covered in cattle hides, and painted bovine skulls with massive horns still attached were placed in the burials. Cattle hearts were used as the basis of cosmetics, cattle ears were found in graves and the Xiaohe people wore boots made of cattle hide (Mai et al., 2016). The rivers and lakes, too, were integral to their survival. Apart from providing water to

survive, the Xiaohe material culture was almost totally derived from the plants that the rivers and lakes sustained. Coffins were formed by up-turned canoes cut from massive tree trunks and grave markers included huge wooden paddles. The Xiaohe people seem to have made very little pottery but stored their possessions in elaborately woven baskets. The Xiaohe culture appears to have emerged in the Tarim Basin without obvious antecedents but, like the Qiemu'erqieke culture, it too may have absorbed elements of a pre-Bronze Age indigenous population. The bigger questions, however, are the search for its antecedents and an explanation as to why and how it developed its unique and remarkable cultural characteristics.

Genetic studies of the Xiaohe population (Li et al., 2010; Li et al., 2015) have shown that the original Xiaohe people comprised an admixture of both East and West Eurasian ancestral populations, with the likelihood that the admixed population might have had some relationship with South Siberian Bronze Age populations. As time went by the population added some traces of Indian lineages and probably some from the Central Asian oases. Overall, however, the south/west Asian components are relatively minor in the Xiaohe population, while the Eurasian ancestry is more dominant.

1.2. Cultures on the margins of Xinjiang

While the Qiemu'erqieke culture has recognised material cultural roots in the western Altaic Éneolithic and Bronze Ages, the origins of the Xiaohe material culture are so far unknown. Links to Qiemu'erqieke and other Eurasian steppe cultures have been suggested on the basis of surface collections of round-based pottery found along the Keriya River, and the Xiaohe round-based baskets have also been compared with Qiemu'erqieke ovoid jars (Han, 2017; Li, 2017; Shui, 2017), but the comparisons are tenuous, while the bulk of the material culture relating to a water-based, cattle herding lifestyle finds no parallels. While the human DNA places the ancestry of the Xiaohe population predominantly in the Eurasian steppe and beyond, the aspects of their daily life are very far removed from any known community in the regions within or surrounding Xinjiang.

Their economy is less problematic. DNA studies of their cattle (Cai et al., 2014) indicate that they are *Bos taurus*, originally of West Asian origin. The Xiaohe wheat is similarly a West Asian crop that has found its way into Xinjiang, most likely along the Tianshan from the Semirech'ye in Kazakhstan (Betts et al., 2014; Spengler III et al., 2014), although lack of archaeological fieldwork makes it currently impossible to test whether there was an alternate route of entry through Kashgar at the western end of the Tarim Basin. Since the broad range of evidence suggests a western origin for the Xiaohe people, it is helpful to review the possible ancestral populations around the borders of Xinjiang.

Beyond Xinjiang, evidence for peoples of the 3rd millennium BCE is sparse but stretches back a little earlier than in Xinjiang itself. To the northwest was the Afanasievo, centred on the western Altai and Minusinsk basin. It represents the earliest evidence for Éneolithic/Bronze Age herding in the eastern steppe region (Frachetti, 2008, 2012) and has been recently dated to 3300–2500 cal. BCE (Svyatko et al., 2009). The Afanasievo economy included up to 50% reliance on hunting, together with a mix of domestic herds combining sheep/goat and cattle. Wheat grains dating from c. 3000 BCE associated with Afanasievo pottery have recently been found at the site of Tongtian-dong in western Xinjiang on the south bank of the Irtysh river (Yu & He, 2017).

Just to the west of Xinjiang in the Semirech'ye region of south-east Kazakhstan, the sites of Begash and Tasbas were occupied by pastoralists practicing vertical transhumance in the western Tianshan. Dates for Phase 1 at Tasbas fall from 2840 to 2500 BCE (Spengler III et al., 2014) and those for Begash Phase 1a from 3100 to 1950 BCE (Frachetti & Mar'yashev, 2007). The ceramics comprised a range of flat bottomed, incised grey wares (Doumani, 2014). The Begash economy was based on pastoralism, but with a greater emphasis on sheep/goat than the

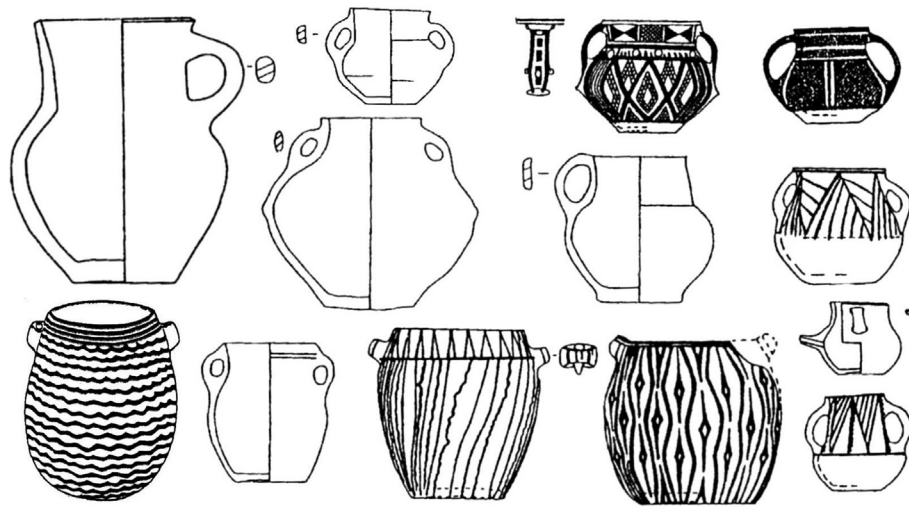


Fig. 7. Ceramics from the early phase of the Tianshanbeilu culture (Lu et al., 2001: fig. 11). Not to scale.



Fig. 8. The Tarim River in the Taklamakan desert (Achou & Hao, 2006: 149).



Fig. 9. Xiaohe Cemetery before excavation (I. Abuduresule).

Afanasievo at c. 75% of the faunal remains, and cattle at only 15%. In the earliest phase at Tasbas a small number of wheat grains was recovered from a burial, hinting at a limited agropastoral economy that became well established by the mid to late second millennium BCE (Spengler III et al., 2014).

Further to the south lies the site of Sarazm in Tajikistan, on the Zarafshan river, flanked by mountains and upstream from the oasis of Samarkand. The pottery of the earliest stage is monochrome or grey but also includes painted vessels. The ceramic forms and the painted decoration reflect influences from the south Central Asian oasis culture of Namazga II. Sarazm has evidence for wheat cultivation (*T. aestivum/durum*) from the mid-4th millennium BCE (3905–3645 cal. BCE) (Isakov, 1996; Isakov et al., 1987; Spengler & Willcox, 2013).

To the east of Xinjiang in Gansu, separated from eastern Xinjiang by a stretch of barren land with small oases (Shen et al., 2017), are sites with early and well developed agricultural production, including cultivation of both introduced wheat and locally domesticated millet. The earliest cultural periods are Majiayao (3350–2250 cal. BCE) and Qijia (2350–1950 cal. BCE) (Dong et al., 2013; Dong et al., 2014; IA, CASS (Institute of Archaeology, Chinese Academy of Social Sciences), 1991). The earliest appearance of wheat from c. 2100 BCE is associated with ancient agro-pastoral sites in the Huoshiliang and Gangangwa area of Gansu (Dodson et al., 2013). The faunal remains at these early sites include sheep/goat and cattle. The pottery comprises highly distinctive shapes and elaborate painted wares.

In summary, the broad picture within Xinjiang from the late 3rd millennium BCE shows a probable absorption of indigenous Neolithic hunter-gathers into new agro-pastoral economies through the presence of incomers and adoption of new technologies. The first connections between the cultural influences of central China and those of Eurasia and Western Asia took place at some time from perhaps the late 4th millennium, but more likely the early to mid-3rd millennium BCE, and can be seen in the cross-transmission of cereals and domesticated animals, as well as the westward filtering of Chinese painted ceramic traditions. None of this, however, does more than establish a general background for the Xiaohe culture, whose riverine and lacustrine habitat and cattle “cult” find no ancestral parallels within or beyond Xinjiang. In the absence of material data on which to draw, a theoretical hypothesis is proposed that might help to explain the unique Xiaohe culture.

1.3. Island biogeography theory

Of all the cultures that might potentially be ancestral to Xiaohe, none strongly exhibit any of the highly distinctive features that characterise it, but they all contain the essential economic toolkit, comprising knowledge of herding of sheep/goat and cattle and some degree of agricultural production. The virtual absence of ceramics from Xiaohe does not help in defining its origins but there are some small hints to cultural connections. Broad comparisons can be made between the



Fig. 10. Xiaohe: Burial M13. Female body (I. Abuduresule).

incised grey wares found widely across eastern Eurasia and southern Siberia from the Neolithic to the Bronze Age and the baskets and wooden bucket found at Xiaohe (Lin, 2008). Wooden anthropomorphic figures found at Xiaohe also occur in Eurasian Bronze Age traditions (e.g., (Savinov & Podolskii, 1977): 279, Table I, 5–7). However, while this is consistent with both the economic and the DNA evidence, it does not explain the apparently sudden shift to a water-based population with an intense focus on cattle herding, together with the unique and very rich symbolic corpus associated with both of these activities.

To explain this we propose to apply a theoretical model drawn from the natural sciences but also successfully applied to human settlement. In the 1980s Cherry (Cherry, 1981; Cherry, 1984; Cherry, 1985) presented a valuable analysis of the process of first human colonisation of the islands of the Mediterranean based on models derived from Island Biogeography Theory (MacArthur & Wilson, 1967). It is proposed here that this model may have some value for our understanding of the transmission of agriculture, pastoralism and other technologies across Xinjiang, and in particular, that it may offer a useful explanation for the appearance, apparently *ex nihilo*, of the remarkable Xiaohe culture. The argument is based on the recognition of two distinct and highly varying ecozones: the high mountain zones of the Dzhungar and Tianshan ranges (Ecozone 1) and the low-lying lacustrine and riverine zones of Lop Nur and the Tarim River (Ecozone 2). The validity of applying Island Biogeography theory to ecozones rather than to true islands is recognised by the original proponents of this theory at the very start of their seminal volume:

Insularity is...a universal feature of biogeography. Many of the principles graphically displayed in the Galapagos Islands... apply in lesser or greater degree to all natural habitats. Consider, for example, the insular nature of streams, caves, gallery forest, tide pools, taiga as it breaks up in tundra, and tundra as it breaks up in taiga (MacArthur & Wilson, 1967: 3–4).

While Island Biogeography Theory has a wide range of aspects concerned with its application to plant and animal species, the key point of relevance in relation to Central Asia is the “founder effect” (MacArthur & Wilson, 1967: 179). Founding populations are typically small and contain only a small part of the genetic variation of the parent population. Being a smaller gene pool, there will be rapid diversification between the founding population and that of its parent group. Cherry's arguments (Cherry, 1981; Cherry, 1984; Cherry, 1985; Johnson et al., 2000) draw on a broader range of issues relating to Island Biogeography Theory but he also includes as a central part of his argument a discussion of the “founder effect” as applied to cultural evolution.

If the migration to an isolated island is by a relatively small group of

people who are unable to reproduce in full the culture of the population from which they are drawn, the culture in the new place will immediately be different from the culture of the homeland. Such differences will become more exaggerated in small populations experiencing prolonged isolation. Quite random factors governing the cultural background and technological skills that chance to be represented among the initial colonists can result in the loss of certain traits and the elaboration of others (Cherry, 1985: 26).

In considering Central Asia, if we then add to this the requirement for a population to move into quite new ecological zones where they must radically adapt their skill set to wholly new forms of economic strategy, it would not be at all surprising to find that there were rapid changes in all aspects of the archaeological record.

Following this model the following scenario is proposed. The most immediate founder population of the Xiaohe people came from among the transhumant pastoralists of the mountain ranges bordering Xinjiang to the west. This area, the mountain regions from the Hindu Kush and the Pamirs north across the western Tianshan and the Dzhungar ranges up to the south-western corner of the Altai, has been identified by Frachetti as a specific environmental zone, which he refers to as the Inner Asian Mountain Corridor, describing it as a zone of exchange (Frachetti, 2013). Of this broad sweep of mountains, grasslands and valleys, greater emphasis should be placed on the western Altai and Semirech'ye as likely interim ancestral homelands, based on the evidence for Eurasian and south Siberian dominance in the Xiaohe DNA. In this region the early Bronze Age subsistence pattern was based on mountain valley transhumance, with a general predominance of sheep/goat over cattle and a low reliance on cultivation of cereals.

To link this population with Lop Nur and the Tarim River, a transition route along the Tianshan must be presumed. While evidence for the early Bronze Age in the Tianshan has not been well defined archaeologically, the presence of such a population can be inferred indirectly through the evidence for the spread of wheat into Gansu by at least the late 3rd millennium BCE and the appearance of millet in the Semirech'ye in the second half of the 3rd millennium BCE (Betts et al., 2014). More directly, the Sa'ensayi Cemetery near Urumchi, in the central Tianshan, now dated as early as 2470 cal. BCE, is the earliest southern outlier of the Qiemu'erqike culture (Archaeological Institute, 2013). Analysis of starches from a Sa'ensayi grinding stone have found traces of wheat flour (Jia, 2018), showing that the people there were practicing agriculture.

Given the Xinjiang deserts, there are very few possible routes of transmission for the exchange of cereals, either circling Xinjiang to the north or to the south, or cutting across the centre along the Tianshan. The latter is by far the most feasible. Along the foothills of the northern slopes of the Tianshan runs a narrow belt of land suitable for dry

farming. This potential is exploited today, mainly by the Chinese Hui population, and was at least also exploited in the mid-20th century when it was described by Shipton, the then British Consul in Kashgar in the 1940s (Shipton, 1951). The late 2nd millennium BCE site of Luanzagangzi in the eastern Tianshan shows that agriculture was well developed here by the Late Bronze Age, from c. 1200 BCE (Jia et al., 2011; Zhang et al., 2017). The valleys rising up above these fields are used today by Kazakh herders in the same pattern of vertical transhumance that has characterised these mountain regions since the Bronze Age, as evidenced by the numerous cemeteries to be found in the high grasslands (Jia et al., 2009). The Kazakhs too engage in limited cultivation of crops in the dry-farming zone. It is therefore proposed that the northern slopes of the Tianshan were home to an early Bronze Age population of transhumant pastoralists, probably producing incised grey ware ceramics, with mixed herds of sheep, goat and cattle, and certainly practicing limited agriculture.

Once established in the mountains, it was inevitable that some members of the population would explore the Lop Nur lake and the Tarim estuary. What was perhaps less inevitable was that a portion of that same population would decide to establish themselves in this region, bringing with them the skills of an agro-pastoral community, which were then adapted to a very different environment. Sheep and goat do well in hill country but poorly on soft, damp ground (Köhler-Rollefson, 1988), while cattle, with high water consumption needs and browsing habits, would flourish in this new region. Land for small scale cereal cultivation was no doubt to be found around the lake shore. The need for mobility in a marshy environment would soon encourage the development of water transport.

The hypothesis then is that a “package” of skills and technologies, including domesticated plants and livestock and attendant management abilities, spread eastwards out of Ecozone 1 along the Tianshan towards Gansu. At some point, as this new economic adaption spread eastwards along the Tianshan, its practitioners ventured onto the southern slopes of the Tianshan and encountered Ecozone 2. Here, the ecozone was best suited to perhaps slightly more extensive agriculture around the lake shores and river banks, with herding still comprising a dominant part of the economic basis, but in a landscape favouring cattle over sheep and goat. The differing landscape requirements were not compatible with dual exploitation, but were best suited to a full adoption of a new lifestyle away from the mountains, and centred round the lakes and rivers. Once separated from the core area of Ecozone 1, the new population of Ecozone 2 rapidly produced a different cultural signature as a result of adaptation to a very different environment, a different balance of economic strategies and consequent rapid change consistent with the basic principles of the “founder effect” inherent in “island colonisation” theory.

The theoretical foundations for this hypothesis are strong, with robust parallels in the biological origins of the model. Gould (Gould, 2011) points out that large, successful, well adapted, mobile, geographically widespread species are particularly prone to stability because evolutionary events are concentrated in episodes of branching specialisations within small, isolated populations. Following our model this may be applied to the agro-pastoral transhumant adaptation which has successfully thrived in the Central Asian mountains from the Bronze Age to the present day. The rise of the Xiaohe culture can be seen as an evolutionary event during an episode of branching specialisation. Returning to MacArthur and Wilson's original work (MacArthur & Wilson, 1963; MacArthur & Wilson, 1967), and the “founder effect”, they note that because island populations are often isolated from mainland populations, they should diverge over time from populations of respective mainland species due to genetic drift, changed selection pressures, or both. In the extreme, isolation on islands will lead to speciation between the island and mainland (Adler, 1992). This divergence, when applied to human cultural traits, does not have to rely on generational change, but can appear rapidly among the initial population.

There must, however, be caveats if the model is to hold up. While the evidence from Xiaohe suggests a wholesale adoption of a new lifestyle, the ways that this was accomplished must not be assumed to have been monolithic. While the term “colonisation” is today problematic, in the sense of a human population taking over control of new land it is appropriate here. Dawson (Dawson, 2011) has presented as a definition of colonisation, ‘a physical and mental appropriation of space, as humans carry out activities that allow them to set themselves up in a geographical area and possibly lay claims over it’. The definition is deliberately general to avoid the restrictive equation that colonisation leads directly to settlement. Dawson emphasises that colonisation encompasses different activities, all requiring different degrees of adaptation to island environments. These may be qualified temporally and spatially, e.g. “seasonal” settlement, “year-round” utilisation, “place-focused” or “resource-focused” occupation, etc. (Dawson, 2011: 36). Cherry (Cherry, 1985) addresses this as well.

In considering the earliest human penetration of the insular environment, then we must not think in terms of direct, long-distance colonising trips to specific “newfound” lands by large groups, but of many tentative, impermanent, short distance reciprocal movements, perhaps to seasonal grazing or fishing grounds, by mere handfuls of farmers already established elsewhere on the mainland.

This must also have been the case with the original establishment of a “colony” by the Lop Nur lakes. Nonetheless, so far no interim stages have been identified. This may be due simply to lack of archaeological fieldwork, but equally possibly, the speed of the transition has left few durable traces.

2. Conclusion

The early Bronze Age of Xinjiang remains poorly documented, but this paper presents an hypothesis to explain the remarkable cultural diversity of the late 3rd and early 2nd millennia BCE in far north-western China. How the distinctive Qiemu'erqieke culture developed is still uncertain, but its ancestral derivation in the Altai is clear. The Tianshanbeilu culture gains its distinctive ceramics from contact with the East, while in the absence of robust archaeological parallels, the extraordinary water-dependent Xiaohe culture can best be explained through theoretical modelling. It is most likely the diversity of landscape in Xinjiang that produced such extreme variations among the first Bronze Age communities to develop there. While as yet not widely recognised, there is broader regional diversity. As Frachetti (2013) notes: “The evidence for diverse pathways in the development of mobile pastoralist economies across the Eurasian steppe suggests that specialised adaptations were developed according to localized ecological and social conditions in the late 4th and 3rd millennia BC.” Xinjiang appears to be no exception to this.

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